

D-SERV® DSU/CSU Operator Manual

Stand-alone Models
78220, 78222, 78240
and 78242
Plug-In Models
78210 and 78230
Data Service Units/
Channel Service Units

Document 5000211



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Revision History

Part #	Date	Description
65-78200104	1993	Issue 4
5000211	December, 2001	Issue 5

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The numbers listed below are current at the time of publication. See the Kentrox Web site for detailed contact and warranty information.

1-800-733-5511 (continental USA only)

1-503-350-6001

email: support@kentrox.com

<http://www.kentrox.com>

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REGULATORY INFORMATION

ADC Kentrox D-SERV units have been tested by a Nationally Recognized Testing Laboratory (NRTL) and are in compliance with Underwriters Laboratories (UL) standard 1459, Edition 2.

FCC PART 15 REQUIREMENTS

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC PART 68 REQUIREMENTS

This equipment complies with Part 68 of the FCC rules. On the bottom of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN) for this equipment. Upon request of the telephone company, you should provide the FCC registration number and the ringer equivalence number (REN) of the equipment which is connected to your line. The D-SERV DSU/CSUs registration number is F8IUSA-74432-DE-N and the REN is 0.0B.

The D-SERV DSU/CSU operates with a 1.544 Mbit/s/s digital channel using an RJ48C USOC 8-pin modular connector on the back of the D-SERV unit.

The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive REN's on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the REN's should not exceed five (5.0). To be certain of the number of devices that may be connected to the line, as determined by the total REN's contact the telephone company to determine the maximum REN for the calling area.

The service code is 6.0N. The Facility Interface Code is 04DU9-C for lines using the Extended Super Frame format, 04DU9-B for lines using the Super Frame format, and 04DU9-S for lines using the B8ZS format. All D-SERV models connect to the network using an RJ48C connector.

The telephone company must be notified before removal of a D-SERV DSU/CSU connected 1.544 Mbit/s/s digital service. If the telephone company notes a problem they may temporarily discontinue service, and will notify you of this disconnection. (If advance notice is not feasible, you will be notified as soon as possible.) When you are notified you will be given the opportunity to correct the problem and informed of your right to file a complaint with the FCC.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service. Normally, the D-SERV DSU/CSU will be used in conjunction with FCC registered equipment that limits the Encoded Analog Content and provides the required Billing Protection. If the connected equipment is not of this type, an affidavit must be supplied to the telephone company where the network connection is to be made. The affidavit is to be notarized, and is to be filed at least ten days before the initial connection.

If trouble is experienced with this equipment (the D-SERV DSU/CSU), please contact the Customer Service Department, Kentrox Industries for repair and warranty information.

Contiguous 48 states including Oregon: 1-800-733-5511
Elsewhere: 1-503-643-1681

If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.

All repairs should be handled by authorized Kentrox Service Personnel.

Equipment Attachment Limitations

CP-01

1.10.1

"NOTICE: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate."

CP-01

1.10.2

"The **Load Number** (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100."

Canadian DOC Requirements

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the Radio Interference Regulations of Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques Classe A prescrite dans le règlement sur le brouillage Radioélectrique Édité par Communications du Canada.

1 INTRODUCTION

General Description

The Kentrox D-SERV DSU/CSU is a low cost, intelligent, single port T1 DSU/CSU that provides channelized connections to T1 or Fractional T1 (FT1) services. The serial data signal can operate in increments of 56 Kbit/s or 64 Kbit/s, up to the full band width of 1.536 Mbit/s. The network T1 signal is always 1.544 Mbit/s. The CSU portion of the D-SERV DSU/CSU insures that the signal is compatible in format and pulse density with T1 requirements. The D-SERV DSU/CSU provides line protection from voltage spikes, surges and line crossings coming from the public network. In addition, the D-SERV DSU/CSU generates alarm signals and performs loop backs to aid in the turn up and trouble-shooting of expensive T1 circuits.

The D-SERV family of products includes models:

- 78220** D-SERV DSU/CSU Stand-Alone Unit, -24 to -48 VDC, with a V.35 Data Port
- 78222** D-SERV DSU/CSU Stand-Alone Unit, 110 VAC, with a V.35 Data Port
- 78240** D-SERV DSU/CSU Stand-Alone Unit, -24 to -48 VDC, with an EIA-530 Data Port
- 78242** D-SERV DSU/CSU Stand-Alone Unit, 110 VAC, with an EIA-530 Data Port
- 78210** D-SERV DSU/CSU Plug-In card, -24 to -48 VDC, with a V.35 Data Port
- 78230** D-SERV DSU/CSU Plug-In card, -24 to -48 VDC, with an EIA 530 Data Port
- 78260** D-SERV 12-slot high density mounting chassis
- 78255** D-SERV 2-unit rack mounting tray

Features

The D-SERV DSU/CSU is available with the following features:

- DIP switch selectable configuration
- Choice of V.35 Data Port or EIA-530 Data Port
- Choice of an internal -24 to -48 VDC or 110 VAC power supply
- Normally Open or Normally Closed Alarm Relay contacts (DC versions only)
- Diagnostics through front panel switch controlled loop backs
- Remote report and alarm retrieval from a DataSMART unit
- Remote diagnostics capability from a DataSMART unit
- Data Port Timing
- Front Panel Status and Alarm LEDs
- RJ48C Network interface connector
- Ability to easily convert Stand-Alone units into Plug-In shelf units — ***DC Powered units only!***
- 12-slot chassis will fit 19" or 23" equipment racks

Specifications

Network Interface	
Line Rate	T1 (1.544Mbit/s)
Framing	SF/ESF (selectable)
Line Code	AMI/B8ZS (selectable)
Bit Stuffing	Enable/Disable 15 zero suppression
Input Signal	DSX-1 from 0dB to -27dB Typical
Output Signal	DSX-1 with LBO 0
Data Port Interface	
Bit Rate	N x 56 kbit/s or N x 64 kbit/s (N= 1 through 24)
Electrical	V.35 or EIA-530 (RS-422/449)
Power	
DC Power	22 to 56 VDC, 6 W
AC Power	105 to 130 VAC, 57 to 63 Hz, 8 W
Mechanical Specifications	
Stand-Alone Size (with feet)	1.93" high x 8.35" wide x 12.0" deep
Stand-Alone Size (without feet)	1.6" high x 8.0" wide x 12.0" deep
Weight	2.47 lb.
12-slot Chassis Size	7.0" high x 17.0" wide x 12.0" deep
Environmental	
Operating Temperature	0-50° C
Relative Humidity	5% to 95% RH
Compatibility	
AT&T 62411	
AT&T 54016	
ANSI T1.403	
Remote Loop Back Code Compatibility	
Line Loop Back	Inband — Set LLB (10000) Reset (100)* Out-of-Band — T1.403 codes*
Data Port Loop Back	Inband — Set DPLB (127 code) Reset (inverted 127 code)*
Payload Loop Back	Out-of-Band — TR 54016 or T1.403 codes*
*Remote loop backs can be reset by toggling the D-SERV front panel loop back switch.	

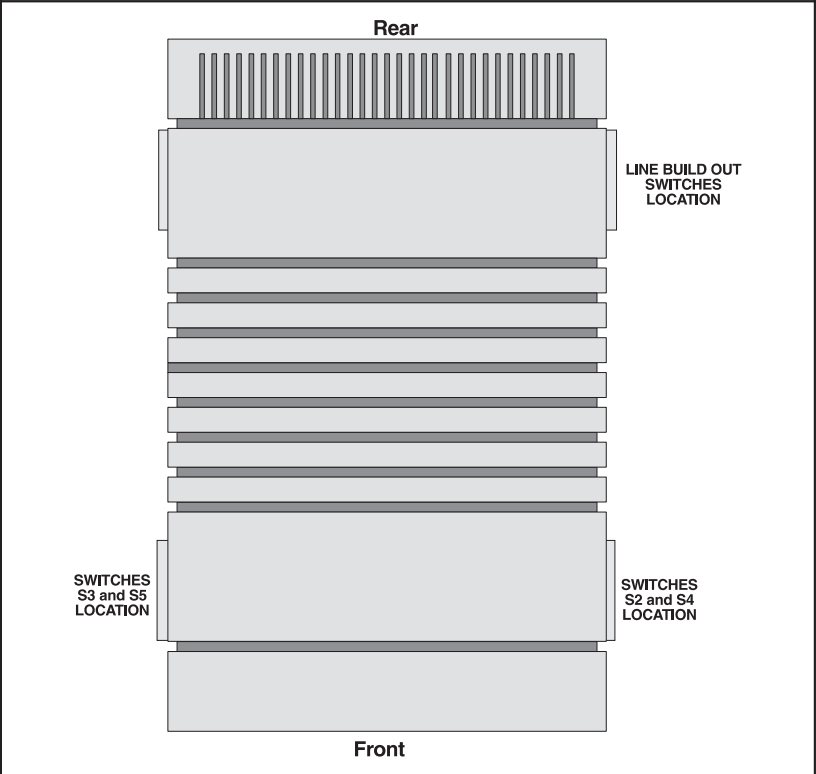
2 CONFIGURATION

The majority of configuration options are set through the DIP switches. A few special configuration options are available through jumpers inside the unit.

If a DataSMART DSU is connected at the far end of the network some report and alarm configuration options can be configured using the **ARC** help menu. Refer to *Section 4, Operation* for details on use of the **ARC** help menu.

A Configuration Work Sheet is provided at the end of this section to help plan configuration and to record which configuration settings have been made.

Figure 1. DIP Switch Locations



DIP Switch Location and Access

The DIP switches are located on the sides of the D-SERV card. Plug-in units have the switches readily accessible.

To access the switches on a stand-alone unit:

- Disconnect all power connections and interface cables
- Turn the D-SERV unit over, and using a phillips screwdriver remove the four screws attaching the legs to the case and remove the legs (see *Figure 2*)
- Set the DIP switches
- Reattach the legs

Figure 2. Leg Removal

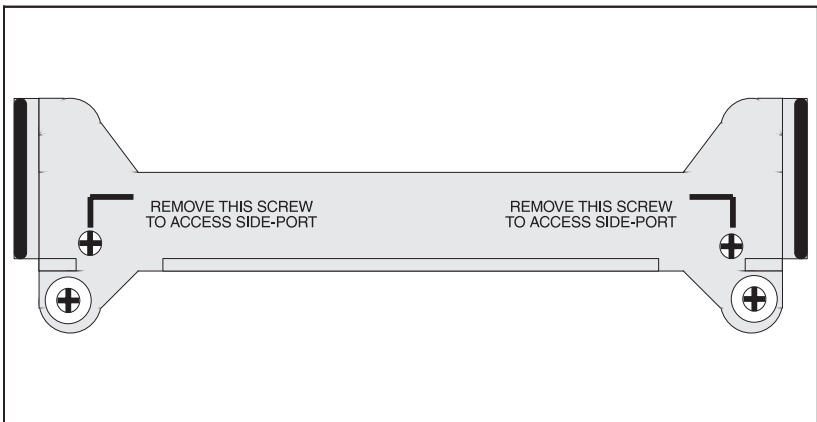
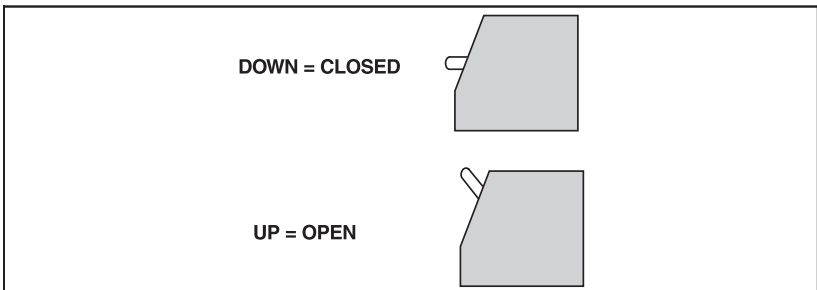


Figure 3. DIP Switch Positions



DIP Switch Configuration Options

Switch S2 — Data Port Bit Rate

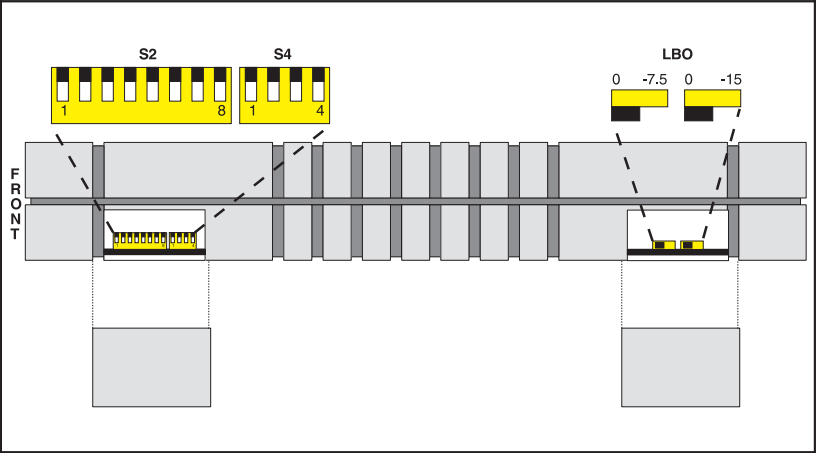
Up to 24 Network Interface DS0 channels can be assigned to the data port. Unused channels remain idle.

Switch S2-1 sets the channel data rate to 56 Kbit/s or 64 Kbit/s.

Switches S2-2 through S2-6 set the number of channels to be activated.

NOTE: Any non-defined setting for S2-2 through S2-6 will select all 24 channels. The channel data rate is still determined by S2-1.

Figure 4. S2 Location



Switch S2 — 56 Kbit/s/Channel Data Port Bit Rate Settings							
Number of Channels	Data Rate (Kbit/s)	1	2	3	4	5	6
24	1344	Down	Down	Down	Down	Down	Down
1 x 56	56	Down	Up	Down	Down	Down	Down
2 x 56	112	Down	Down	Up	Down	Down	Down
3 x 56	168	Down	Up	Up	Down	Down	Down
4 x 56	224	Down	Down	Down	Up	Down	Down
5 x 56	280	Down	Up	Down	Up	Down	Down
6 x 56	336	Down	Down	Up	Up	Down	Down
7 x 56	392	Down	Up	Up	Up	Down	Down
8 x 56	448	Down	Down	Down	Down	Up	Down
9 x 56	504	Down	Up	Down	Down	Up	Down
10 x 56	560	Down	Down	Up	Down	Up	Down
11 x 56	616	Down	Up	Up	Down	Up	Down
12 x 56	672	Down	Down	Down	Up	Up	Down
13 x 56	728	Down	Up	Down	Up	Up	Down
14 x 56	784	Down	Down	Up	Up	Up	Down
15 x 56	840	Down	Up	Up	Up	Up	Down
16 x 56	896	Down	Down	Down	Down	Down	Up
17 x 56	952	Down	Up	Down	Down	Down	Up
18 x 56	1008	Down	Down	Up	Down	Down	Up
19 x 56	1064	Down	Up	Up	Down	Down	Up
20 x 56	1120	Down	Down	Down	Up	Down	Up
21 x 56	1176	Down	Up	Down	Up	Down	Up
22 x 56	1232	Down	Down	Up	Up	Down	Up
23 x 56	1288	Down	Up	Up	Up	Down	Up

Switch S2 — 64 Kbit/s/Channel Data Port Bit Rate Settings							
Number of Channels	Data Rate (Kbit/s)	1	2	3	4	5	6
24	1536	Up	Down	Down	Down	Down	Down
1 x 64	64	Up	Up	Down	Down	Down	Down
2 x 64	128	Up	Down	Up	Down	Down	Down
3 x 64	192	Up	Up	Up	Down	Down	Down
4 x 64	256	Up	Down	Down	Up	Down	Down
5 x 64	320	Up	Up	Down	Up	Down	Down
6 x 64	384	Up	Down	Up	Up	Down	Down
7 x 64	448	Up	Up	Up	Up	Down	Down
8 x 64	512	Up	Down	Down	Down	Up	Down
9 x 64	576	Up	Up	Down	Down	Up	Down
10 x 64	640	Up	Down	Up	Down	Up	Down
11 x 64	704	Up	Up	Up	Down	Up	Down
12 x 64	768	Up	Down	Down	Up	Up	Down
13 x 64	832	Up	Up	Down	Up	Up	Down
14 x 64	896	Up	Down	Up	Up	Up	Down
15 x 64	960	Up	Up	Up	Up	Up	Down
16 x 64	1024	Up	Down	Down	Down	Down	Up
17 x 64	1088	Up	Up	Down	Down	Down	Up
18 x 64	1152	Up	Down	Up	Down	Down	Up
19 x 64	1216	Up	Up	Up	Down	Down	Up
20 x 64	1280	Up	Down	Down	Up	Down	Up
21 x 64	1344	Up	Up	Down	Up	Down	Up
22 x 64	1408	Up	Down	Up	Up	Down	Up
23 x 64	1472	Up	Up	Up	Up	Down	Up

Switch S2 — Data Port LOS Processing

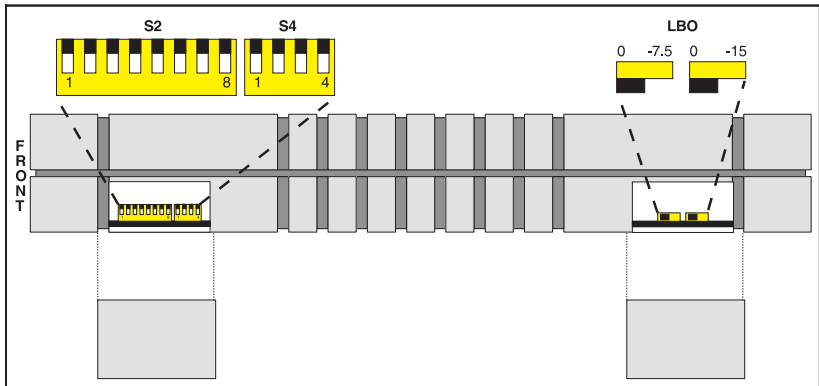
Some DTE equipment changes the state of the RTS and/or DTR signal lines on a regular basis which the D-SERV DSU/CSU may interpret as an LOS condition. Options for determining a data port LOS condition are if the RTS signal line is de-asserted, the DTR signal line is de-asserted, or if both of the signal lines are de-asserted at the same time. The D-SERV DSU/CSU also provides the option of not monitoring for data port LOS by ignoring the condition of the RTS and DTR signal lines.

Switches S2-7 and S2-8 configure this option.

NOTE: If a data port LOS condition occurs, all active channels will transmit All Ones out to the network. All idle channels will continue to transmit Idle code. If the unit has been configured for data port timing (tail circuit timing) the timing source will switch to internal clock timing.

Switch S2 — Data Port LOS Processing		
Function	7	8
RTS	Down	Down
DTR	Up	Down
RTS and DTR	Down	Up
None	Up	Up

Figure 5. S2 Location



Switch S4 — Starting DS0 Channel Selection

If fewer than 24 channels have been activated, the user can select which channel is first. For example, if four channels have been activated any of the eight channel starting options may be selected. Unused channels remain idle.

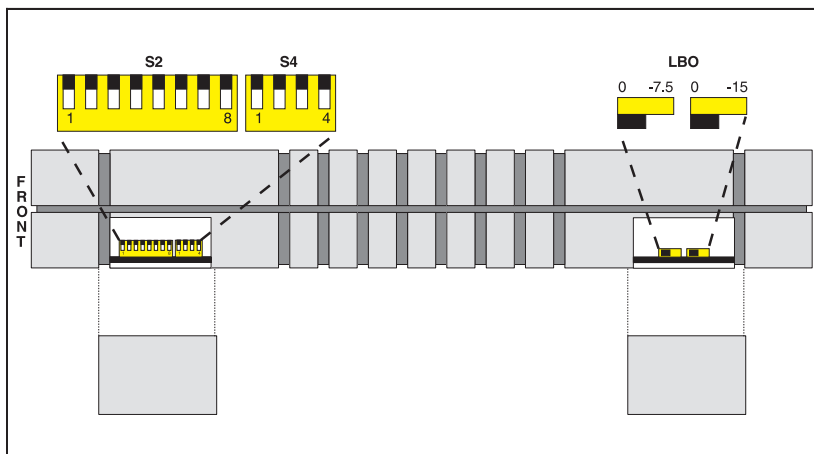
Switches S4-1, S4-2, and S4-3 select the starting channel.

NOTE: It is not allowed to activate more channels than can be accommodated between the starting channel and the 24th channel. For example, if ten channels have been activated and channel 16 has been chosen as the starting channel the D-SERV DSU/CSU will alert the user of a configuration conflict.

In the event of a conflict the D-SERV DSU/CSU will flash the front panel POWER, RED ALARM, and DATA LEDs red. The last valid starting channel selected by the user is used until the configuration error is corrected by the operator.

Switch S4 — Starting DS0 Channel Selection			
Starting Channel	1	2	3
Channel 1	Down	Down	Down
Channel 2	Up	Down	Down
Channel 3	Down	Up	Down
Channel 4	Up	Up	Down
Channel 6	Down	Down	Up
Channel 8	Up	Down	Up
Channel 12	Down	Up	Up
Channel 16	Up	Up	Up

Figure 6. S4 Location



Switch S4 — Alternating and Contiguous Channels

The D-SERV DSU/CSU can be configured to activate channels sequentially (contiguous) or configured to activate every other channel (alternating). For example, if four channels have been activated and the starting channel is channel 16, contiguous configuration will activate channels 16, 17, 18, and 19. Alternating configuration will activate channels 16, 18, 20, and 22.

Alternating channels is useful to preserve T1 pulse density if large amounts of zeros are to be transmitted as data.

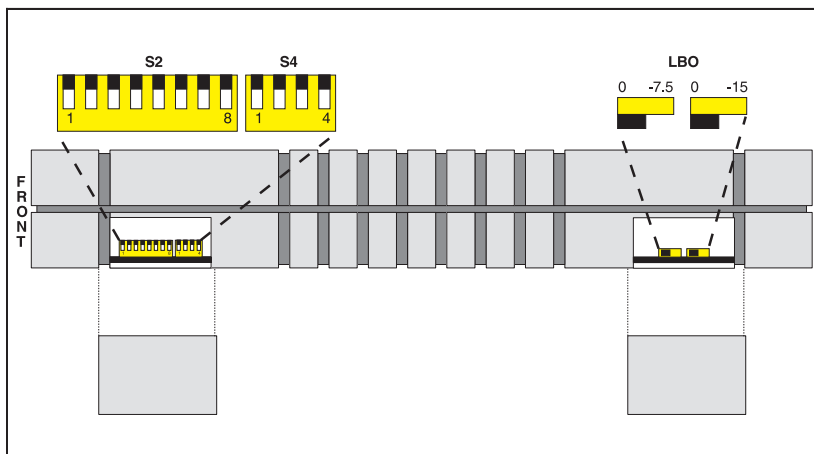
Switch S4-4 selects the alternating or contiguous channel option.

NOTE: It is not allowed to activate more channels than can be accommodated between the starting channel and the 24th channel. For example, in contiguous mode, if ten channels have been activated and channel 16 has been chosen as the starting channel the D-SERV DSU/CSU will not function properly. In alternating mode, if six channels have been activated and channel 16 has been chosen as the starting channel the D-SERV DSU/CSU will alert the user of a configuration conflict.

In the event of a conflict the D-SERV DSU/CSU will flash the front panel POWER, RED ALARM, and DATA LEDs red. The last valid starting channel selected by the user is used until the configuration error is corrected by the operator.

Switch S4 — Alternating and Contiguous Channel Options	
Function	4
Contiguous Channels	Down
Alternating Channels	Up

Figure 7. S4 Location



Switch S5 — Advanced Data Port Configuration

Data Inversion

The D-SERV DSU/CSU allows the operator to invert the data received from the DTE. This allows long strings of zeros to be converted to strings of ones to preserve network T1 pulse density. The DSU at the far end must also be set for Data Inversion.

Switch S5-1 configures the Data Inversion option.

Data Port Clock Source

The D-SERV DSU/CSU clocks data on the data port in one of two ways. INTERNAL looped clock provides a clock internally generated by the D-SERV DSU/CSU. EXTERNAL looped clock will clock data using the clock returned from the DTE, but originally sourced from the D-SERV DSU/CSU. This option is useful when propagation delays may be encountered due to long cables, or if a synchronous device such as a DSU or modem is connected to the data port.

Data Port Clock Inversion

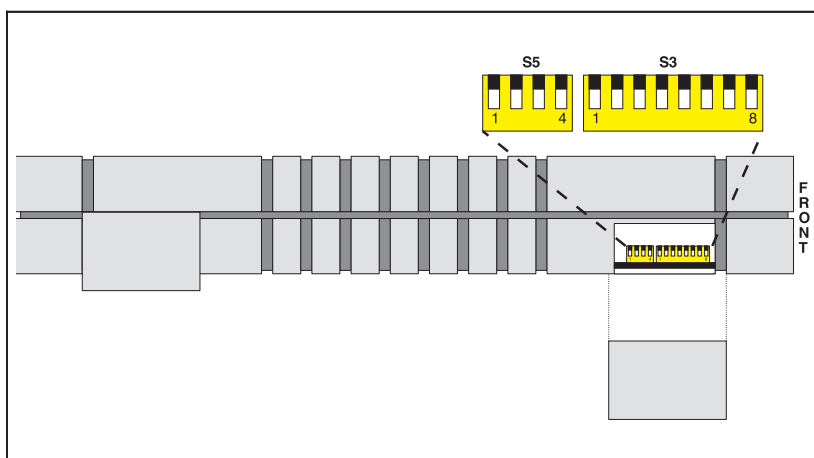
INVERTING the clock changes the clocking trigger (on received data only) from leading edge to trailing edge to function with some DTE equipment.

Switches S5-2, and S5-3 of S5 control Data Port Clock Source.

NOTE: Selecting DP clock source (Data Port Timing) with Switches S3-5 and S3-6 automatically sets the Data Port Clock Source to EXTERNAL, overriding the INTERNAL setting of Switch S5-2. If another Clock Source is subsequently selected, the INTERNAL setting of Switch S5-2 is restored.

Switch S5 — Data Inversion and Data Port Clock Source			
Function	1	2	3
Data Inversion OFF	Down		
Data Inversion ON	Up		
Internal DP Clock Source		Down	
External DP Clock Source		Up	
DP Clock Inversion OFF			Down
DP Clock Inversion ON			Up

Figure 8. S5 Location



Switch S3 — Network Interface Configuration

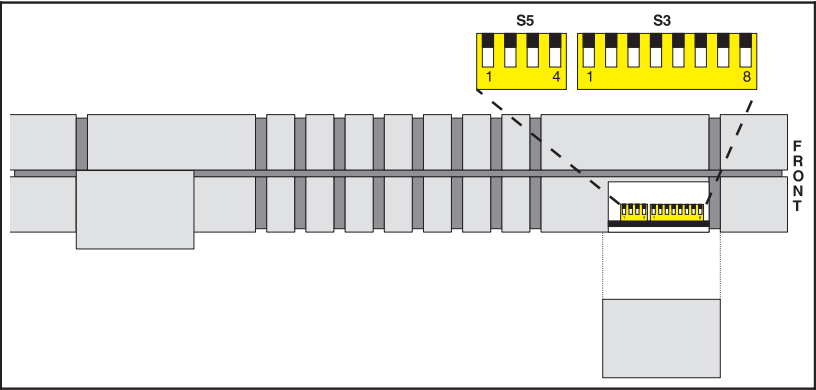
Network Interface Configuration options include Super Frame (SF) or Extended Super Frame (ESF), Alternate Mark Inversion (AMI) or B8ZS coding, bit stuffing disabled or bit stuffing after 15 zeros and Performance Report Message (PRM) disabled or PRM enabled.

Switches S3-1, S3-2, S3-3, and S3-4 control the Network Interface Configuration Options.

NOTE: It is not allowed to enable SF framing and PRM generation at the same time. In the event of a conflict the D-SERV DSU/CSU will flash the front panel POWER, RED ALARM, and DATA LEDs red until the configuration error is corrected by the operator.

Switch S3 — Network Interface Configuration				
Function	1	2	3	4
SF	Down			
ESF	Up			
AMI		Down		
B8ZS		Up		
Disable Bit Stuffing			Down	
Enable Bit Stuffing after 15 zeros			Up	
Disable PRM				Down
Enable PRM				Up

Figure 9. S3 Location



Switch S3 — Network Interface Clock Source

The D-SERV DSU/CSU can derive the Network Interface 1.544 MHz clock in one of three ways. LOOP derives the clock from the network input. INT derives the clock from a crystal internal to the D-SERV DSU/CSU. DP derives the 1.544 MHz clock from the data port (tail circuit timing application).

When the data port is configured as the clock source (tail circuit timing) the data port input clock rate must match the data port bit rate set with the DIP switches on S2. Selecting DP clock source also automatically sets the Data Port Clock Source to EXTERNAL overriding the INTERNAL setting of Switch S5-2. If another Clock Source is selected the INTERNAL setting of Switch S5-2 is restored.

Switches S3-5 and S3-6 configure the Network Interface Clock Source.

NOTE: The DPLB switch position cannot be used if the D-SERV unit is configured for data port timing (tail circuit timing). In the event of a conflict the D-SERV DSU/CSU will flash the front panel POWER, RED ALARM, and DATA LEDs red.

Switch S3 — Network Interface Clock Source		
Clock Source	5	6
Loop	Down	Down
Internal	Up	Down
Data Port	Down	Up
Loop	Up	Up

NOTE: The LOOP network clock source option can be configured by setting both switches either UP or DOWN.

Switch S3 — Alarm De-Activation Time

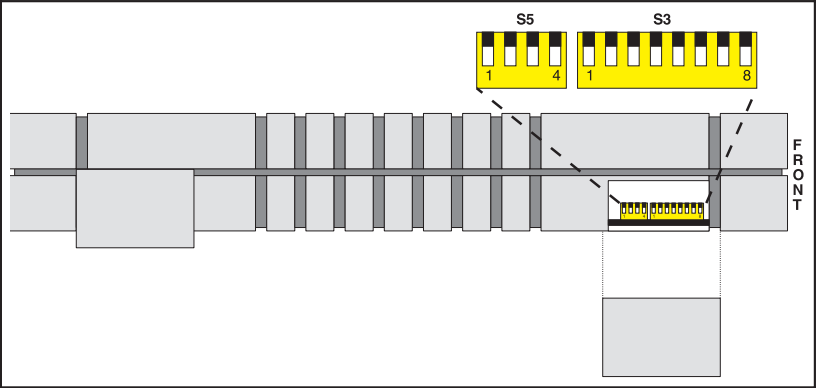
When the D-SERV DSU/CSU is in an alarmed state, a certain set period of time must elapse without the occurrence of another alarm before the alarmed state can be cleared. The D-SERV options are 1, 5, 10 and 15 seconds.

Network alarms are Loss of Signal (LOS), Alarm Indication Signal (AIS), and Out of Frame (OOF).

Switches S3-7 and S3-8 configure the Alarm De-activation Time.

Switch S3 — Alarm De-Activation Time		
De-Activation Time	7	8
15 seconds	Down	Down
10 seconds	Up	Down
5 seconds	Down	Up
1 second	Up	Up

Figure 10. S3 Location



Line Build Out (LBO) Switches

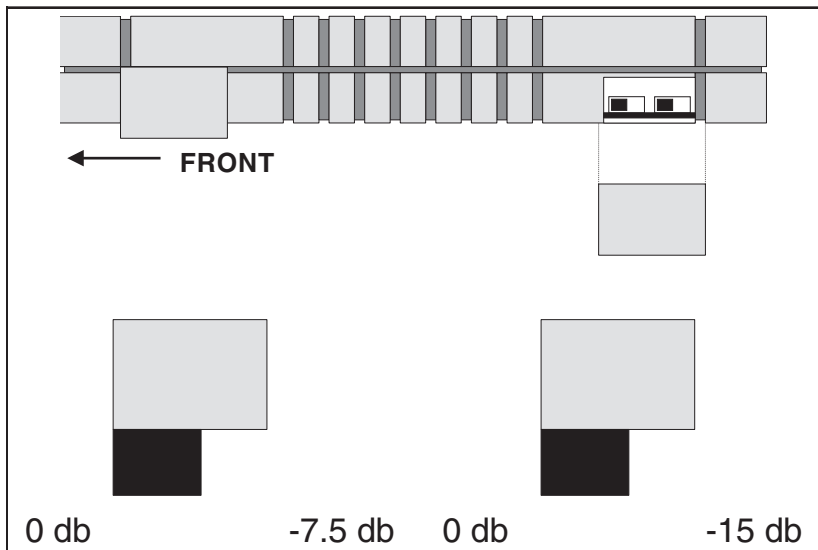
The setting for Line Build Out (LBO) to the network is determined by the carrier and is based on the line distance to the nearest T1 repeater. The different LBO settings allow the user to adjust the attenuation of the signal transmitted out the network port of the D-SERV DSU/CSU. The default setting is 0.0 dB. Your T1 service provider will be able to tell you if a non-default setting is required in your application.

WARNING:

Improper setting of the LBO switches may cause interference with other telephone company services. Proper setting of the LBO switches will ensure reliable operation both for you and for others.

If it is necessary to modify the LBO settings, first locate the switches on the right side of the D-SERV DSU/CSU towards the rear as you are facing the unit. Using a narrow, non-conductive device, set the switches to the appropriate setting (0.0 dB, -7.5 dB, -15.0 dB, or -22.5 dB). For example, to set the LBO to -22.5 dB, set both switches to the right.

Figure 11. LBO Switches



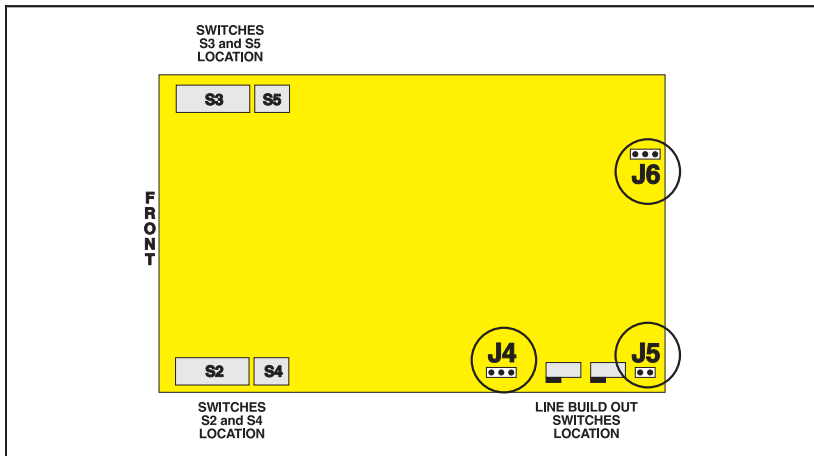
Jumper Location and Access

The configuration jumpers are located on the D-SERV card. Plug-in units have the jumpers readily accessible.

To access the jumpers on a stand-alone unit:

- Disconnect all power connections and interface cables
- Turn the D-SERV unit over, and using a phillips screwdriver remove the four screws connecting the two sides of the case (see *Figure 13* for location of screws)
- Separate the case
- Set the jumper(s)
- Close the case and secure with the four screws

Figure 12. Configuration Jumper Location



Jumper Configuration Options

NOTE: When the jumpers are viewed as in *Figure 12*, pin 1 is always to the left.

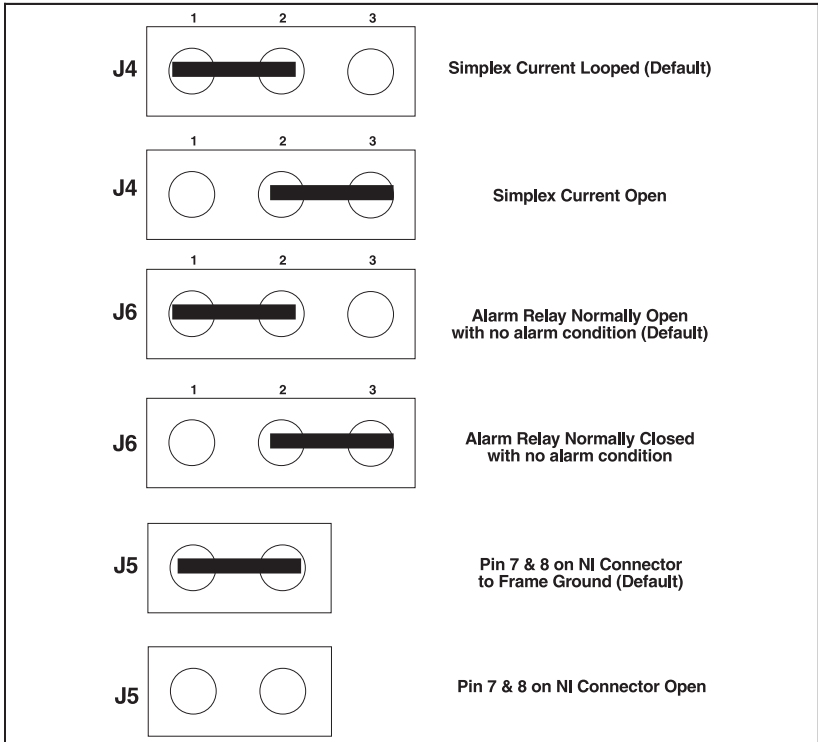
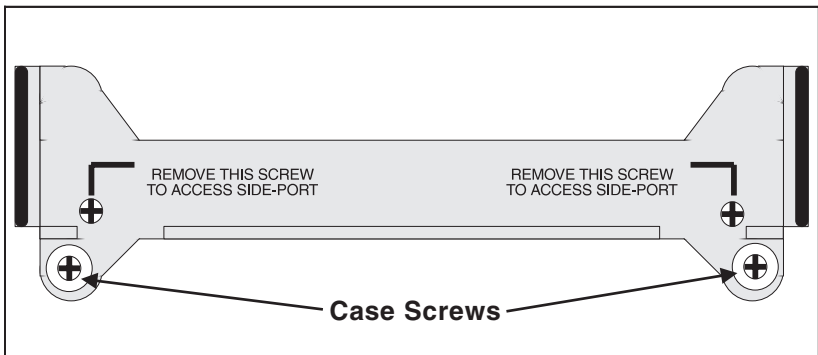


Figure 13. Screws for Case Separation



Configuration Work Sheet

Default values are highlighted in ***Bold Italics***.

Data Port Configuration			
Function	Switch	Options	Selection
Rate per Channel	S2	<i>56 Kbit/s</i> or 64 Kbit/s	
Channel Mapping	S2	# of Channels x Rate =Frequency (<i>1344</i>)	
Starting Channel	S4	<i>1,2, 3, 4, 6, 8, 12</i> or 16	
Channel Sequence	S4	Alternating or <i>Contiguous</i>	
Data Inversion	S5	On or <i>Off</i>	
DP Clock Source	S5	<i>Internal</i> or External	
DP Clock Inversion	S5	On or <i>Off</i>	
DP LOS Processing	S2	<i>RTS</i> , DTR, Both or None	

Network Interface Configuration			
Function	Switch	Options	Selection
Framing	S3	<i>SF</i> or ESF	
Coding	S3	<i>AMI</i> or B8ZS	
Bit Stuffing	S3	After 15 0's or <i>None</i>	
PRM Generation	S3	On or <i>Off</i>	
Clock Source	S3	<i>Loop</i> , Internal or Data Port	
Alarm De-Activation	S3	1, 5, 10 or <i>15 seconds</i>	
Line Build Out	LBO	<i>0 dB</i> , -7.5 dB, -15 dB and -22.5 dB	

Configuration Jumpers			
Function	Jumper	Options	Selection
Simplex Current	J4	Simplex Current <i>Looped</i> or Open	
Alarm Relay	J6	Alarm Relay <i>Normally Open</i> or Normally Closed	
NI Grounding	J5	Pin 7 & 8 on NI connected to <i>Frame Ground</i> or Open	

3 INSTALLATION

Installation Check List

Installing D-SERV Stand-Alone Units

- Read Operator Manual thoroughly
- Select Site for installation
- Configure unit with the DIP switches
- Complete mechanical installation/mounting
- Connect power and ground
(-24 to -48 VDC and 110 VAC operation)
- Connect Alarm Relay (DC units only)
- Connect interface cables

Installing D-SERV Plug-In Units

- Read Operator Manual thoroughly
- Select Site for installation
- Install 12 slot High Density Mounting Chassis
- Install enough back panels in the chassis to service the
D-SERV Plug-Ins that are being installed
- Connect power and ground (-24 to -48 VDC only)
- Connect Alarm Relay
- Connect interface cables
- Configure units with the DIP switches
- Individually slide each D-SERV unit into a slot in the
chassis and secure with the large screws in the front cover

Accessories

Cables

D-SERV Cables			
Interface	Description	Length	Part Number
Network	RJ48C Plug/RJ48C Plug	5 feet	93005141
	RJ48C Plug/RJ48C Plug	10 feet	93010141
	RJ48C Plug/RJ48C Plug	15 feet	93015141
	RJ48C Plug/RJ48C Plug	25 feet	93025141
	RJ48C Plug/RJ48C Plug	50 feet	93050141
	RJ48C Plug/RJ48C Plug	75 feet	93075141
	RJ48C Plug/RJ48C Plug	100 feet	93100141
V.35 Data Port	MRAC34P/MRAC34P	10 feet	95010052
	MRAC34P/MRAC34P	25 feet	95025052
EIA-530 Data Port	DB25P/DB25P	10 feet	95010061
	DB25P/DB25P	25 feet	95025061

Tail Circuit Timing Cables

D-SERV Cross Pinned Cables		
Description	Length	Part Number
V.35 to Generic V.35 (MRAC34P/MRAC34P)	10 feet	95010055
* V.35 to DataSMART Quadport V.35 (MRAC34P/DB25P)	10 feet	95010056
* V.35 to DataSMART V.35 (MRAC34P/MRAC34P)	10 feet	95010057
* EIA-530 to Generic EIA-530 (DB25P/DB25P)	10 feet	95010058
* This cable is required where a DataSMART DSU/CSU provides data port clock to the D-SERV unit		

Data Port Adapters

D-SERV Data Port Adapters		
Description	Length	Part Number
EIA-530 to RS449 (DB25P/DB37P)	10 feet	95010066
V.35 Gender Changer (MRAC34P/MRAC34S)	1 foot	78896

Shelf and Mounting Accessories

D-SERV Shelf and Mounting Accessories	
Description	Part Number
12-Slot Plug-In Chassis	78260
Wall Mounting Brackets	78035
Rack Mounting Tray (holds two units)	78255

Site Selection

Use the following guidelines in selecting a site:

- (110 VAC only) The installation site should include a grounded 110 VAC power receptacle.
- The standard specifications for the following cable distances as prescribed by the standards documents are:

Interface	Suggested Maximum Cable Length
V.35	50 FEET
EIA-530	200 FEET

NOTE: At lower than maximum speed with proper cabling, longer distances can be achieved. For more information please refer to the application note on cabling available from your Kentrox representative.

- The site should provide enough room for adequate ventilation and cable routing. Allow at least 4.0 inches at the rear of the unit for cables and air flow. Do not block any of the air vents on the unit. Allow clearance for operation and maintenance.
- The site should provide a stable environment. The operating area should be clean and free from extremes of temperature, humidity, shock and vibration.
- Relative humidity should stay between 0 and 95%. Do not operate the unit at an altitude greater than 10,000 feet.

If any of these operating limits are exceeded, the unit may not operate properly.

After Unpacking

Inspect the unit for any signs of damage. Report any damage to the carrier and contact your Kentrox customer representative. Retain all packing material in case you need to move or ship the unit in the future.

Mounting

NOTE: It will be necessary to set the configuration of the D-SERV DSU/CSU before mounting the unit. Refer to *Section 2, Configuration* for complete configuration information.

There are four ways to mount the D-SERV DSU/CSU:

- Desktop mounting (on any flat surface)
- Vertically, on a wall using model #78035 Wall Mount Brackets
- Side by side in a 19" or 23" equipment rack using model #78255 Mounting Tray
- Where space is critical, up to 12 D-SERV units can be mounted in a 19" or 23" equipment rack using the model #78260 High Density Mounting Chassis

NOTE: Refer to the Installation Instructions accompanying the Wall Mount Brackets, the Mounting Tray or the High Density Mounting Chassis for details on their installation.

Desktop Mounting

Any clean level surface can be a platform for the D-SERV unit.

Electrical Installation



CAUTION: Always disconnect all telephone lines before servicing or disassembling this equipment. The power connection with frame ground should be the first electrical connection connected when installing D-SERV units, and the last electrical connection disconnected when removing D-SERV units.

Stand-Alone AC Power Connection

Plug the power cord on the D-SERV unit into a grounded 115 VAC power receptacle.

As soon as power is applied to the D-SERV DSU/CSU the unit will commence self test.

Stand-Alone DC Power Connections

Use a power supply capable of providing a voltage in the range 22 to 56 VDC. Power supplies are available from Kentrox.

Remove the Power/Alarm connector from the back panel by unscrewing the the screws at either end of the connector (see *Figure 14*).

Using 14 AWG leads or larger, wire earth ground to the frame ground post (post 2) to ground the unit.

CAUTION: Make sure your DC power supply is OFF or unplugged before making power connections.

- Using 20 AWG to 14 AWG leads, wire power to the supplied six-post connector plug. Connect the positive voltage from your DC power supply to the V+ post (post 1) and the negative voltage from your DC power supply to the V- post (post 3).

Stand-Alone Alarm Relay Connections (optional)

The ALM (post 5) and COM (post 6) posts on the six-post connector provide an optional alarm output. The default connection is Normally Open (NO). Circuit or signal failure in the D-SERV DSU/CSU causes a contact to close in the alarm relay. This triggers the alarm outputs and activates an external alarm wired to these connections.

Network Alarms activating the alarm relay are LOS, AIS, OOF and YELLOW Alarm.

Stand-Alone Power/Alarm Connector Installation

CAUTION: DO NOT install the power connector upside down. The D-SERV unit will not operate if the six-post connector is installed incorrectly.

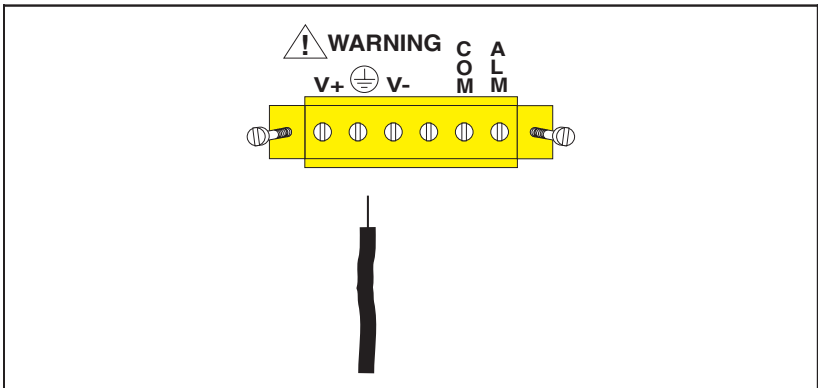
Firmly push the six-post connector on to the power connector at the rear of the unit and secure to the back panel with the screws at either end of the connector.

As soon as power is applied to the D-SERV DSU/CSU the unit will commence self test.

Plug-In Power and Alarm Connections

Refer to the 12-Slot Chassis Installation Instructions for D-SERV Plug-In connections.

Figure 14. Stand-Alone DC Power/Alarm Connector



Self Test

At power-up, the D-SERV DSU/CSU runs a complete self test routine that checks all the data paths, I/O ports, read/write memory, and the program checksum. At the end of the self test the LEDs will flash in sequence.

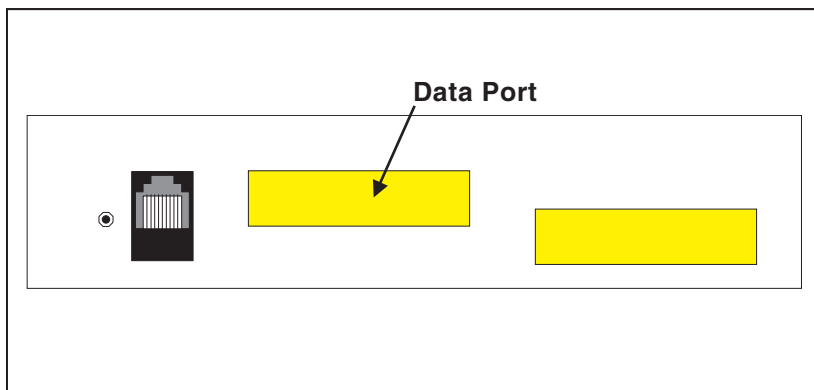
If the POWER/FAIL LED lights red after self test, this indicates a failed test by the equipment or the power supply. If the POWER/FAIL LED lights green after self test, all tests were passed and operation may begin as normal. The self test should last approximately 20 seconds.

In the event of a configuration conflict the D-SERV DSU/CSU will flash the front panel POWER, RED ALARM, and DATA LEDs red. until the configuration error is corrected by the operator.

If the POWER/FAIL LED continues to glow red, call Kentrox Technical Support:

In the Continental United States of America: 1-800-733-5511
Elsewhere: 503-643-1681

Figure 15. V.35 and EIA-530 Data Port Location



Data Port Connection

Data port cables, adapters and their applications are listed on *pages 24 and 25*.

- Connect the cable to the data port on the D-SERV back panel. Secure the connector to the back panel with the screws provided on the connector.
- Connect the other end of the cable to the DTE or DSU data port, according to the manufacturer's instructions.

Data Port Pin Assignments			
Circuit Name	EIA-530 Pins	V.35 Pins	RS-449 Pins
Protective Ground	1	A	—
Signal Ground	7	B	19
RTS	4, 19	C	7, 25
CTS	5, 13	D	9, 27
DSR	6, 22	E	11, 29
RI	22	—	—
DTR	20, 23	H	12, 30
Rec Line Sig Det (DCD)	8, 10	F	13, 31
Tx Data A	2	P	4
Tx Data B	14	S	22
Rx Data A	3	R	6
Rx Data B	16	T	24
External Clk A	24	U	17 (DTE Source)
External Clk B	11	W	35
Tx Signal Timing A	15	Y	5
Tx Signal Timing B	12	AA	23
Rx Signal Timing A	17	V	8
Rx Signal Timing B	9	X	26
Local Loop Back	18	—	10
Remote Loop Back	21	—	14
Test Mode	25	—	18
Sig Gnd Return (530A)	23	—	—

Tail Circuit Timing Set Up

In order for tail circuit timing to function correctly:

- Select the correct cross pinned cable for your application. Refer to *page 25* for cables available from ADC Kentrox. Refer to *Figures 16 through 19* for pin outs.
- The data port source bit rate (from a DataSMART unit or a MUX) must match the D-SERV data port bit rate set with the DIP switches on S2.
- On the D-SERV unit, set Switch S3 for Data Port Timing (S3-5 Down and S3-6 Up).
- If you are connecting to a DataSMART unit, the DataSMART must be configured for data port external clocking (the **DCLK<your data port>:E** command).

Figure 16. Tail Circuit Timing (TCT) Application

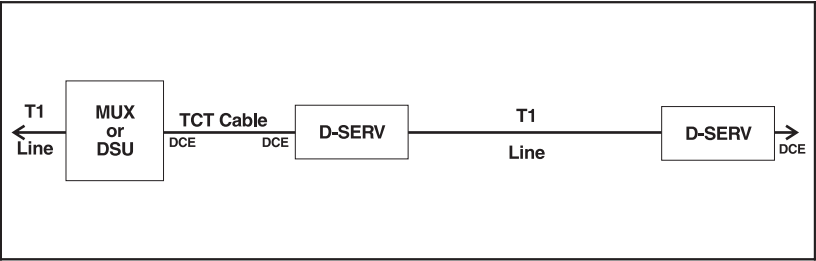


Figure 17. Cable #95010055 Pin Outs

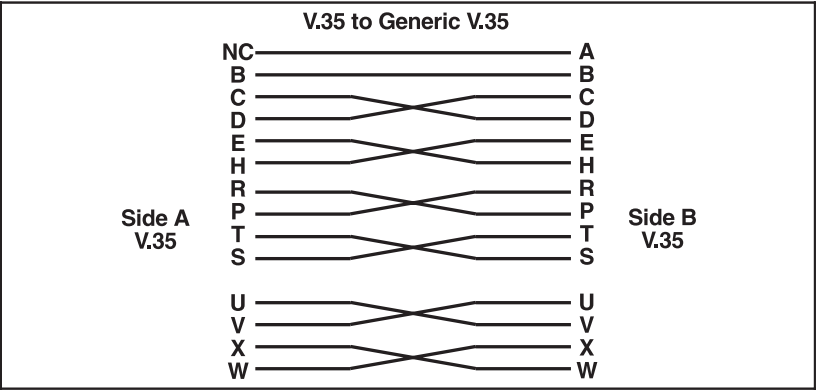


Figure 18. Cable #95010056 Pin Outs

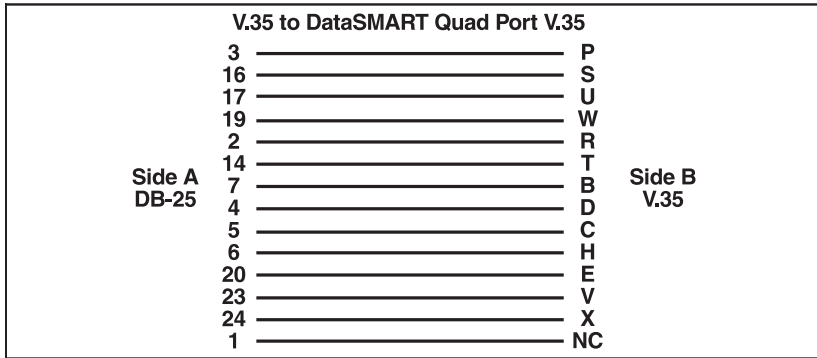


Figure 19. Cable #95010057 Pin Outs

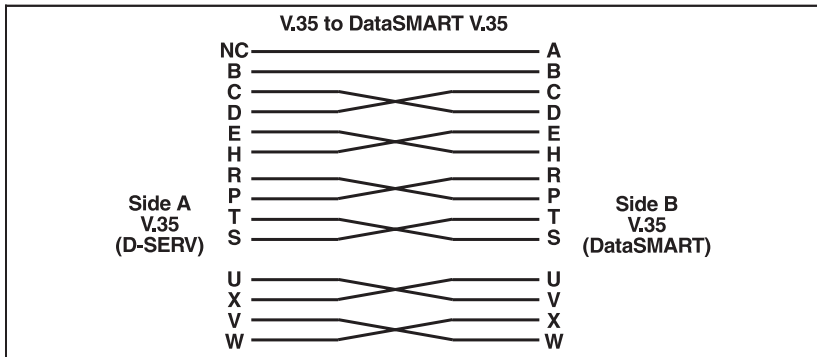
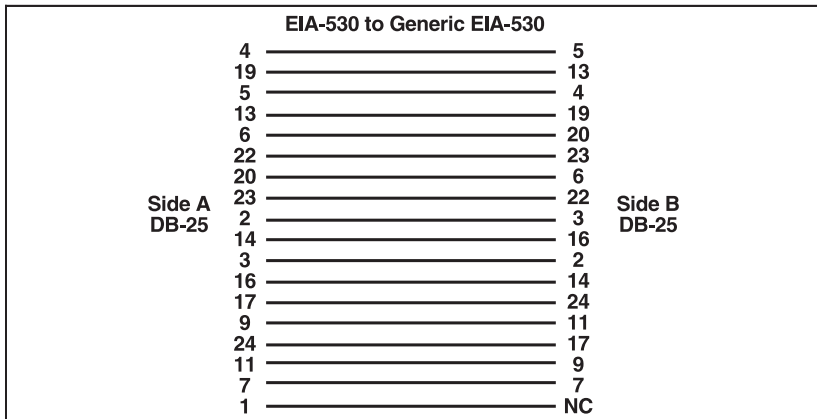


Figure 20. Cable #95010058 Pin Outs



Network Connection

The D-SERV DSU/CSU is connected to the network through an RJ48C eight-pin modular connector.

- Use Kentrox cable #93xxx141. The xxx refers to cable length. Cables are available in standard lengths from five feet to one hundred feet long. These cables use a male RJ48C plug at each end. ***Do Not use unshielded cable.***
- Connect the cable to the network port on the D-SERV back panel.
- Connect the shield ground wire on the cable to the grounding lug to the left of the network connector.
- Connect the other end of the cable to the network equipment using the manufacturer's or the Telco's instructions.

RJ48C Network Port Pin Assignments	
Circuit Name	Pins
RxD Data (T1)	2
RxD Data (R1)	1
TxD Data (T)	5
TxD Data (R)	4
Frame Ground	7 and 8

Figure 21. Network Port Location (AC Powered Units)

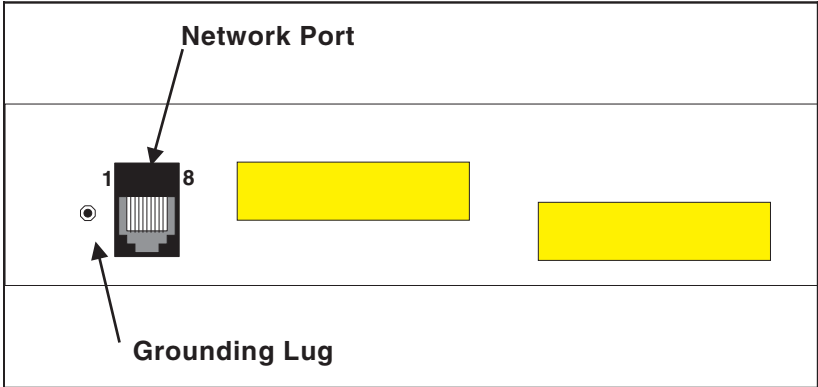


Figure 22. Network Port Location (DC Powered Units)

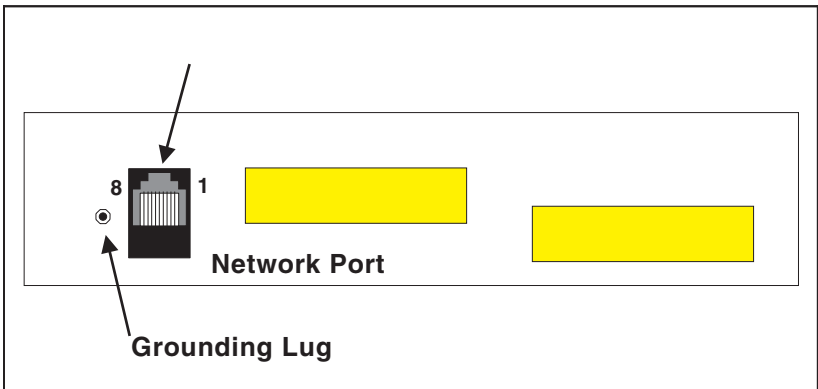
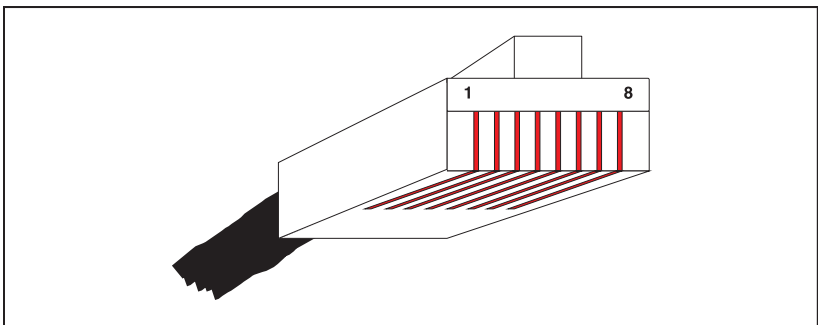


Figure 23. RJ48C Pin Designation



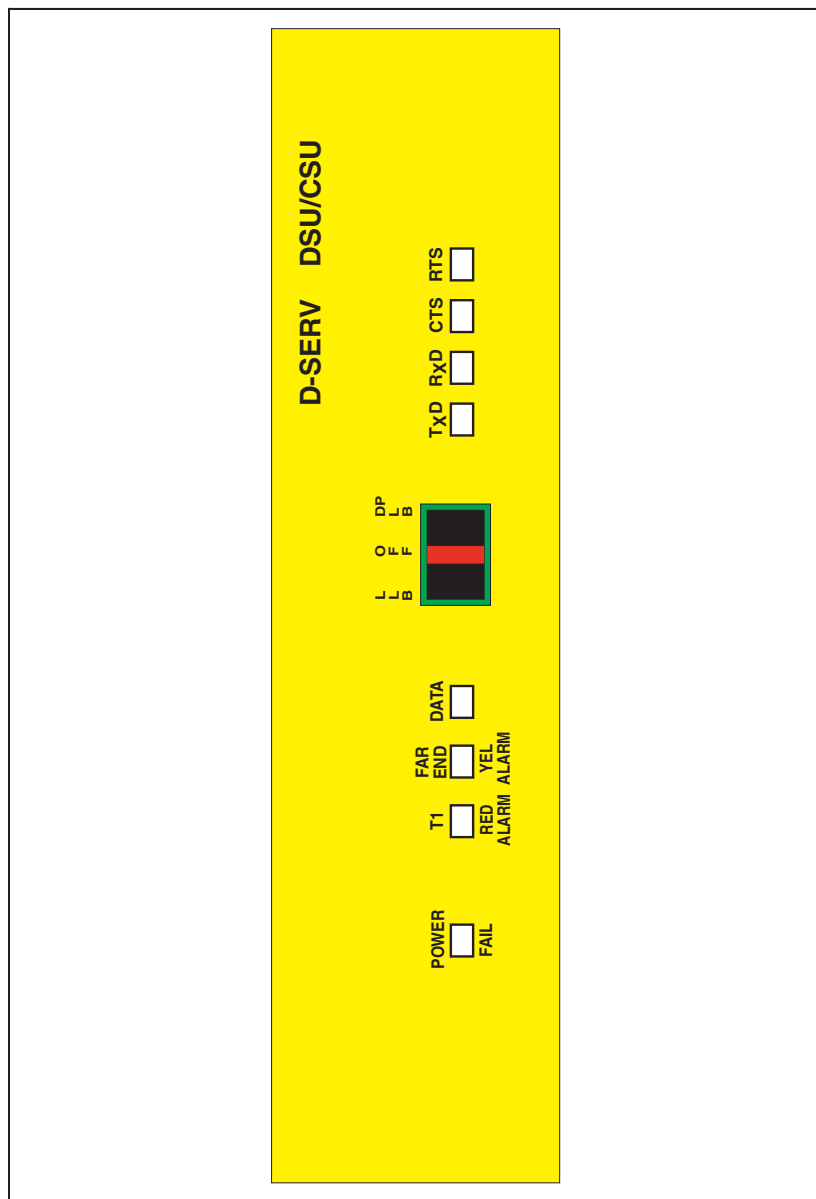
4 OPERATION

Front Panel Operation

LEDs

Front Panel LED Indicators		
Power	Off	Unit is unpowered
	Red	Self Test failure
	Green	Unit is powered and operational
	Blinking Red	Configuration conflict***
Red Alarm	Red	T1 LOS
	Blinking Red	T1 OOF
	Slow Blinking Red	Configuration conflict***
Yellow Alarm	Yellow	T1 AIS
Data	Yellow	T1 Yellow Alarm detected
	Green	Valid Data is Present
	Blinking Green	Network Set, Reset or Test code is detected
	Red	Test Active
	Blinking Red	Network BPV's or CRC errors
TxD	Yellow	Configuration conflict***
RxD	Yellow	Receiving data from DTE
CTS	Yellow	Transmitting data to DTE
RTS	Yellow	Clear to Send asserted
		Request to Send asserted
***In the event of a configuration conflict the D-SERV unit will flash the front panel POWER, RED ALARM, and DATA LEDs red until the configuration error is corrected by the operator.		

Figure 24. D-SERV Front Panel



Loop Back Switch

The Loop Back Switch has three positions, Line Loop Back (LLB), Off (reset loop back), and Data Port Loop Back (DPLB). Loop backs initiated with the Loop Back Switch cannot be reset by commands from a DataSMART DSU at the far end and override any previously set loop backs from the far end.

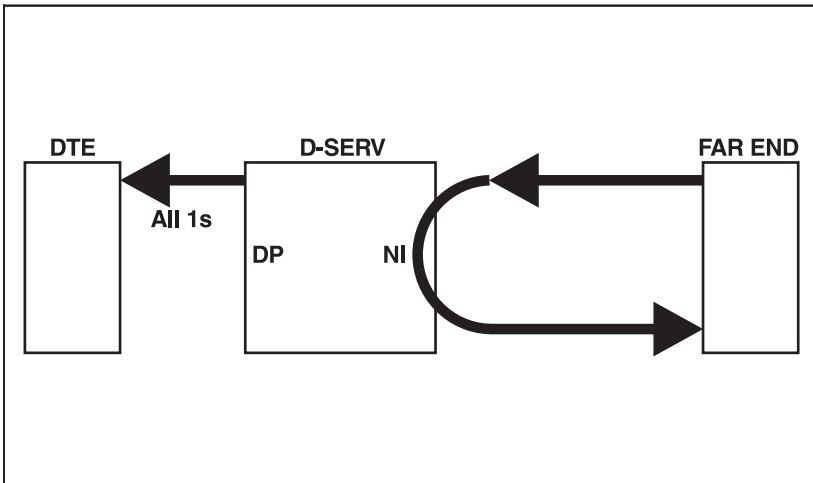
Line Loop Back (LLB)

When Line Loop Back (LLB) is activated from the Loop Back Switch or from the far end, the NI signal is looped back to the NI without modification. All 1s is sent to the DTE.

When to Use

LLB is used to identify trouble in the network. During the loop back, an all ones signal is sent out the data port to indicate service is interrupted. LLB provides minimal penetration into the D-SERV DSU/CSU; it does not remove BPVs or other line coding errors, so that test signals such as Fault Locate trios pass through unaltered.

Figure 25. Line Loop Back (LLB)



Data Port Loop Back (DPLB)

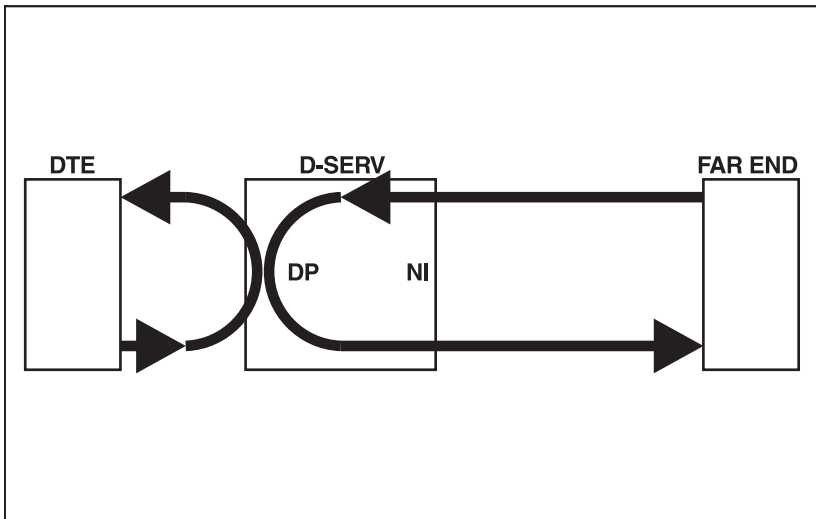
When DPLB is activated from the Loop Back Switch or from the far end, Data Port Loop Back (DPLB) consists of a combination of Data Port Loop Back and Data Terminal Loop Back (DTLB). It loops the T1 bundle at the Data Port Interface without affecting the rest of the payload (DPLB). At the same time the D-SERV DSU/CSU loops the data equipment signal at the Data Port Interface (DTLB).

When to Use

DPLB is used to test the T1 side of the Data Ports and the data equipment lines.

NOTE: The DPLB switch position cannot be used if the D-SERV unit is configured for data port timing (tail circuit timing). In the event of a conflict the D-SERV DSU/CSU will flash the front panel POWER, RED ALARM, and DATA LEDs red.

Figure 26. Data Port Loop Back (DPLB)



Remote Operation

You can gain access to the D-SERV DSU/CSU by using a DataSMART DSU via the ESF Facility Data Link (FDL) and the **ARC** command. The D-SERV DSU/CSU must be fully operational (in frame) and the ESF Data Link must be intact. No alarms or loop backs can be active on the D-SERV unit.

When you enter the **ARC** command from the DataSMART DSU, the DataSMART DSU becomes invisible and simply passes the commands directly to the D-SERV DSU/CSU, and retransmits the responses received from the D-SERV unit out the DataSMART DSU command port.

Figure 27. D-SERV Main Menu (MM)

```
D-SERV T1 DSU/CSU V1.01 Copyright (c) 1992 Kentrox, LLC
NAME: PORTLAND, OR

SD:mm,dd,yy      - Set Date
ST:hh:mm         - Set Time
SN:id            - Set Name
ST15 / ST60      - Set Threshold Timing to 15 or 60 Minutes
EST:n / UST:n    - Set Errored or Unavailable Second Threshold, n = 0..900
EAR / DAR        - Enable/Disable Alarm Relay
EDDLB / DDLLB    - Enable/Disable T1.403 Line Set Message Detection
EDPL1 / DDPL1    - Enable/Disable Data Port Code Detection
ZALL / ZUN       - Zero All or NI Reports

TXV              - View Channel Assignment
ADCV             - View Data Port Configuration
ACV / LCV        - View Alarm or Loopback Detection Configuration
SCV / WYV        - View System Configuration or What's Your Version

LM - Lower Menu

MM>
```

The D-SERV menu is divided into an upper section and a lower section. The lower section can be viewed by typing **LM**.

Figure 28. D-SERV Lower Menu (LM)

```
D-SERV T1 DSU/CSU V1.01 Copyright (c) 1992 Kentrox, LLC
NAME: PORTLAND, OR

S          - System Status Screen
NSR / AHR  - Network Statistical and Alarm History Report
NCV        - View Network Configuration

RLB        - Reset Loop backs
DRC        - Disconnect from Remote Unit Control

MM         - Main Menu

LM>
```

The function of the commands listed in the D-SERV menu are the same as the DataSMART DSU command functions. The response from the D-SERV DSU/CSU will be different from the response from a DataSMART DSU since the D-SERV DSU/CSU is not as feature rich.

The D-SERV DSU/CSU will respond to report requests from DataSMART DSU for **RUNLR**, **RUNSR**, **RCNLR**, and **RCNSR** over the Facility Data Link.

Refer to the DataSMART DSU Operator Manual for information on the commands in the D-SERV menu, alarm parameters and reports.

Remote Loop Backs

A far end DataSMART or a test set can set a Line Loop Back (LLB), a Data Port Loop Back (DPLB) or a Payload Loop Back (PLB) on the D-SERV DSU/CSU (see codes on *page 3*). These loop backs can be reset or overridden by the Loop Back Switch on the D-SERV DSU/CSU.

Refer to the DataSMART DSU Operator Manual for detailed information on these loop backs.

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